

CLAIMS

1. A connector device comprising:

A gas sealing means (11, 13) deforming in accordance with a pressing action; and

5 first and second connecting hollow members (7, 9), each formed by a material not allowing permeation of pressurized gas through it, forming a connection part having a hollow part through which a pressurized gas is passed, and having a groove (19G, 17G, 19G1, 19G2) in which
10 the gas sealing means is arranged in a part where the gas of the connection part leaks,

the groove (19G, 17G, 19G1, 19G2) in which the gas sealing means (11, 13) is arranged being formed in a path through which the pressurized gas is leaked and
15 discharged at the connection part of the first and second connecting hollow members (7, (9)),

the groove having a first part (19B) into which the gas is introduced and on which a high pressure is applied and a second part (19T) connected to the first part
20 and in which a low pressure of the gas being discharged is applied, a sectional area of the second part being smaller than the sectional area of the first part, and

the gas sealing means arranged in the groove being deformed due to a pressure difference between the
25 high pressure and the low pressure and prevents the leakage

of the gas from the clearance in the second part of the groove.

2. A connector device as set forth in claim 1,
wherein the gas sealing means (11, 13) is deformed by the
5 pressing action of the pressurized gas introduced into the
first part of the groove, enlarges in a diametrical
direction in the second part, and narrows the clearance of
the second part to such an extent where the gas is not
leaked from the clearance.

10 3. A connector device as set forth in claim 2,
wherein

the pressurized gas is heated, and
the gas sealing means (11, 13) is formed by a
material which is heated by the temperature of the heated
15 pressurized gas and further enlarged in the diametrical
direction in the second part.

4. A connector device as set forth in claim 2 or 3,
wherein the gas sealing means comprises:

a first gas seal member (11) made of rubber
20 arranged in the first part of the groove and deformed in
the groove by the pressing action of the pressurized gas;
and

a second gas seal member which is formed by a
material not allowing permeation of the pressurized gas
25 through it and having a smaller deformation than the first

gas seal member (11), arranged in the second part of the groove adjacent to the first gas seal member so as to suppress the movement of the first gas seal member (11) by the pressing action of the pressurized gas, enlarged in the 5 diametrical direction in the second part of the groove by the deformation of the first gas seal member (11) and the pressing action by the movement to narrow the clearance of the second part to an extent where the gas is not leaked from the clearance.

10 5. A connector device as set forth in claim 4,
wherein

the first gas seal member comprises an O-ring
made of rubber, and

15 the second gas seal member is formed by a plastic
or synthetic polymer material, not allowing the permeation
of the pressurized gas through it.

6. A connector device as set forth in any one of
claims 1 to 5, wherein

20 the second part of the groove is inclined so as
to become shallower than the depth of the first part toward
a direction in which the gas is discharged, and

25 the part of the second gas seal member contacting
the inclined surface of the second part of the groove is
inclined and can move on the inclined surface of the second
part of the groove at the time of the pressing action by

the pressurized gas.

7. A connector device as set forth in claim 6,
wherein the angle of the inclined surface of the second gas
seal member (13) contacting the second part of the groove
5 is larger than the angle of the inclined surface of the
second part of the groove, and a front end of the inclined
surface of the first gas seal member is crushed at the time
of the pressing action by the pressurized gas to further
narrow the clearance of the second part.

10 8. A connector device as set forth in any one of
claims 1 to 7, wherein the pressurized gas is pressurized
carbon dioxide gas.

9. A connector device as set forth in any one of
claims 1 to 8, wherein the first and second connecting
15 hollow members (5, 9) have hollow parts (71, 82) for
fitting connecting a first pipe (3) and a second pipe (5).

10. A connector device as set forth in any one of
claims 1 to 9, wherein:

said first connecting hollow part (7) has:
20 a first main body (70); and
a housing (17) formed integrally with the
first main body (70) and having a hollow part (73),
said second connecting hollow part (9) has
a second main body (90); and
25 a shaft (19) formed integrally with the

second main body (90), having a hollow part (93), and having a shaft (19) having an outside diameter enabling insertion into the hollow part (73) of said housing (17),

said shaft (19) is inserted with a predetermined clearance with an inner wall of the hollow part (73) of said housing (17) so that the hollow part (93) of said shaft (19) faces the hollow part (72) of said housing (17),
5 a groove (19G) is formed positioned between the outer circumference of said shaft (19) and the inner wall
10 of the hollow part (73) of said housing (17) and having a first part (19B) into which said pressurized gas is introduced on the outer circumference of said shaft (19) or the inner wall of the hollow part (73) of said housing (17)
15 along a direction of flow of said pressurized gas and a second part (19T) which continues from the first part, has a smaller cross section than the cross section of said first part, and from which said pressurized gas is discharged,

20 said O-ring (11) is arranged at the first part of said groove contacting the outer circumference of said shaft (19) and the inner wall of the hollow part (73) of said housing (17), and

said backup ring (13) is arranged at the second part of said groove.

25 11. A connector device as set forth in any one of

claims 1 to 9, wherein:

said first connecting hollow part (7) has a first main body (70) and a housing (17) formed integrally with the first main body (70) and having a hollow part (73),

5 said second connecting hollow part (9) has a second main body (90) and a shaft (19) formed integrally with the second main body (90), having a hollow part (93), and having a shaft (19) having an outside diameter enabling insertion into the hollow part (73) of said housing (17),

10 said shaft (19) is inserted with a predetermined clearance with an inner wall of the hollow part (73) of said housing (17) so that the hollow part (93) of said shaft (19) faces the hollow part (72) of said housing (17),

said groove (19G) is defined positioned between
15 the outer circumference of said shaft (19) and the inner wall of the hollow part (73) of said housing (17) and having a first part (19B) into which said pressurized gas is introduced on the outer circumference of said shaft (19) or the inner wall of the hollow part (73) of said housing (17) along a direction of flow of said pressurized gas and a second part (19T) which continues from the first part, has a smaller cross section than the cross section of said first part, and from which said pressurized gas is discharged,

25 said O-ring (11) is arranged at the first part of

said groove contacting the outer circumference of said shaft (19) and the inner wall of the hollow part (73) of said housing (17), and

5 said backup ring (13) is arranged at the second part of said groove.

12. A connector device as set forth in claim 10 or 11, wherein:

the second part of said groove is inclined so as to become shallower than a depth of said first part in a 10 direction of discharge of said gas,

the angle of said inclined surface of said backup ring (13) contacting the second part of said groove is larger than the angle of the inclined surface of the second part of said groove, and the front end of the inclined 15 surface of the first gas seal member is crushed at the time of the pressing action by said pressurized gas to further narrow the clearance of said second part.

13. A connector device as set forth in any one of claims 1 to 9, wherein

20 said first connecting hollow member (53) has a first flange (57) and a first hollow part (471),

 said second connecting hollow member (49) has a second flange (59) and a second hollow part (491),

25 said first hollow part (471) and said second hollow part (491) are communicated when said first flange

and said second flange are brought into facial contact,
around said first hollow part (471) or said
second hollow part (491) of said first flange or said
second flange in facial contact, said groove (53G) is
5 formed along a direction of flow of said pressurized gas
from the connection part of said first hollow part (471)
and said second hollow part (491) toward the outside of
said connector device, said groove having a first part
(19B) at which said pressurized gas enters and a second
10 part (19T) continuing from said first part, having a cross-
section smaller than the cross-section of said first part,
and discharging said pressurized gas,
said first gas seal member (11) is arranged at
said first part of the groove while contacting said first
15 flange or said second flange, and
said second gas seal member (13) is arranged at
said second part of the groove.

14. A connector device as set forth in any one of
claims 1 to 9, wherein
20 said first connecting hollow member (107) has a
first main body and a housing (117) formed integrally with
said first main body, said housing (117) having a first
hollow part and having a flat first end face at its front
end,

25 said second connecting hollow member (109) has a

second main body and a shaft (119) formed integrally with said second main body, said shaft (119) having a second hollow part, having an outside diameter enabling insertion inside the hollow part of said housing (117), and having a 5 flat second end face at its front end,

the second hollow part of said shaft (119) is close to the first hollow part of said housing (117), and said shaft (119) being inserted with a predetermined clearance from the inner walls of the first hollow part of 10 said housing (17),

the first end face of the front end of said housing (117) abuts against the first end face of said first main body of said second connecting hollow part to define a first abutting surface (AS1) and a second abutting 15 surface (AS2),

a corner part between the first end face of the front end of said housing (117) and the front end of said first hollow part is cut so as to define said groove with the connection part between said second main body of said 20 second connection member and said shaft (119), and said groove is fit with a rubber seal member.

15. A connector device comprising:

gas sealing means deforming in accordance with a pressing action; and

25 first and second connecting hollow member, each

formed by a material not allowing permeation of pressurized gas through it, forming a connection part having a hollow part through which the pressurized gas is passed, and having a groove in which the gas sealing means is arranged
5 in a part where the gas of the connection part leaks,
wherein

said first connecting hollow member (53) has a first flange (57) and a first hollow part (471),

10 said second connecting hollow member (49) has a second flange (59) and a second hollow part (491),

15 said first hollow part (471) and said second hollow part (491) face each other and define a first part of said groove and said first flange and said second flange define a second part of said groove when said first flange and said second flange are made to face each other, and

said second part of the groove is fit with a sheet-shaped gas seal means (151) having a hole communicating said first hollow part (471) and said second hollow part (491).

20 16. A connector device as set forth in claim 15, wherein said second gas seal means is formed from a plastic or synthetic polymer material, not allowing permeation of said pressurized

25 17. A connector device as set forth in any one of claims 10 to 12, wherein

the first end face of the front end of said housing (117) abuts against the first end face of the main body of said second connecting hollow member to define a first abutting surface (AS1) and a second abutting surface 5 (AS2) forming a second part of a second groove,

a corner part at the hollow part side of the first end face of the front end of said housing (117) is cut so as to define a first part of said second groove where said gas seal means is to be arranged, and

10 the first part of said second groove is fit with a rubber second seal member.

18. A connector device as set forth in any one of claims 10 to 12, wherein:

a space between the hollow part of said housing 15 (17) and the outer circumference of said shaft (19) forms the first part of the second groove,

an end surface on the front end of said housing (17) and a clearance facing the end surface of the main body of said second connecting hollow member form the 20 second part of said second groove, and

a sheet-shaped second seal is fit at the second part of said second groove.

19. A connector device as set forth in claim 18, wherein said second gas seal means is formed from a plastic 25 or synthetic polymer material, not allowing permeation of

said pressurized gas.

20. A connector device as set forth in any one of claims 10 to 12, wherein:

a second groove having a first part and a second 5 part continuing from the first part and having a smaller cross section than that of said first part is annularly formed at the periphery of said shaft (19) along a direction of leakage of said pressurized gas on either of the end surface of the front end of said housing (117) or 10 the end surface of the main body of said second connecting hollow member, and

a sheet-shaped second seal member is fit at the second part of said second groove.

21. A connector device as set forth in claim 20, 15 wherein said second gas seal means is formed from a plastic or synthetic polymer material, not allowing permeation of said pressurized gas.